

SG10KTL/SG12KTL/SG15KTL

PV Grid-Connected Inverter User Manual

About This Manual

Thank you for purchasing the inverter from Sungrow. We hope that this device will meet with your satisfaction when you use it in PV plant system.

Aim

The purpose of this manual is to provide detailed product information and instructions for installation and operation of PV grid-connected inverter SG10KTL, SG12KTL and SG15KTL.

Target Readers

The manual is provided to people who need to install and operate this grid-connected inverter.

How to Use This Manual

Read this manual and other document before installation and operation with the inverter.

The document must be stored carefully and available at all times.

The contents of this manual will be periodically updated or revised if necessary. However discrepancies cannot be excluded. Please make the object as the standard or download the latest version of this manual via www.sungrowpower.com.

Symbols Explanation

Important instructions contained in this manual should be followed during installation, operation and maintenance of the inverter. And they will be highlighted by these symbols.



DANGER indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.



WARNING indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.



CAUTION indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.



NOTICE indicates a situation which, if not avoided, could result in equipment or property damage.



NOTE indicates additional information, emphasized contents or tips to help you solve problems or save time.

Symbols On the Inverter Body





This symbol indicates that you should wait at least 10 minutes after disconnecting the inverter from the utility grid and from the PV input before touching any inner live parts.



Hot surface! May exceed 60°C!



Look over the user manual before any operation onto the inverter!



Only qualified personnel can open and service inverter!



Do not disconnect connectors from the unit under load!

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SAFETY AND PRODUCT INFORMATION

For Installer and User



1

Safety Instructions

About This Chapter

This chapter indicates crucial safety instructions. Please read "Safety Instructions" carefully before any work with the inverter.

IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS

The SG10KTL/SG12KTL inverter is designed and tested according to international safety requirements. But as with all electrical and electronic equipments, certain precautions should be observed during installation, operation and maintenance process.

Operation or work performed incorrectly may result in damage to:

- The life and well-being of the operator or a third party
- The inverter and other properties that belong to the operator or a third party

Therefore in order to reduce the risk of injury and ensure normal work of the inverter, you must carefully read and follow all instructions, cautions and warnings.

Before Installation



The first thing to do after receiving the unit is to check for any visible damage to the packaging or to the inverter. Should there be any questions, please contact the shipping company and Sungrow before installing.

During Installation



Lethal voltage exists!

Make sure to cover the PV arrays with light-tight materials. Exposed to sunlight, PV arrays will output lethal voltage.



All tasks of installation must be performed by qualified personnel only.

- They are trained specially.
- They have read this manual and comprehended all operation regulations and related safety instructions.



Only after receiving prior approval from the utility company and qualified personnel installing the inverter, should the inverter be connected to the utility grid.



All electrical connections must be in accordance with local and national electrical codes.



All cables must be firmly attached, undamaged, properly insulated and adequately dimensioned.

Maintenance and Modification



Any malfunction that may impair inverter safety must be repaired immediately before the inverter is restarted again. Please contact your local authorized personnel if any maintenance is required.



There is a risk of damage to the inverter if it is improperly modified.

Never modify the inverter or other components of the inverter. Otherwise it will lead to loss of any and all warranty rights.

1 DANGER

- Disconnect the inverter from utility grid and then PV arrays before any maintenance work
- Even when the inverter is disconnected, lethal voltages still exist within the
- Before any maintenance work, wait for at least ten minutes after disconnection and then perform the work.

NOTICE

Electrostatic discharge may damage the inverter.

During replacement or installation of the inner components, the technical personnel should take appropriate protective measures such as wearing an electrostatic bracelet.

Others



All safety instructions, warning labels and nameplate on the inverter body:

- Must be clearly visible
- Must not be removed, covered and pasted



These regulations should also be followed:

- The regulations related to the electricity fed into grid
- The safety instructions related to the PV arrays

2

Product Introduction

About This Chapter

This chapter introduces intended use, main circuits and constituent parts of the inverter.

2.1 Intended Usage

SG10KTL, SG12KTL and SG15KTL (They are referred to SG10/12/15KTL inverters hereinafter), which are 3-phase string inverters without transformer, are crucial units between the PV strings and utility grid in the small-scaled PV power system.

Inverter is dedicated to converting direct current power generated by the PV strings into the stable alternating current, which will be fed into the utility grid. An example about intended usage of the inverter is show in Fig 2-1.

Where the positive or negative terminal of PV strings needs to be grounded, SG10/12/15KTL inverters cannot be connected into this PV power system.



Any other or additional usage is not permitted except the intended usage. SG10/12/15KTL inverters must only be connected to utility grid. Local loads (home appliance, lights, motor loads, etc.) can not connected between inverter and AC circuit breaker.

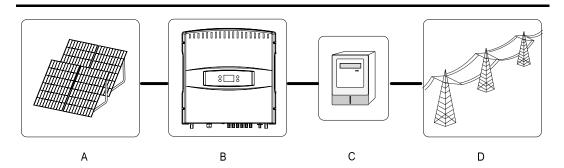


Fig 2-1 Inverter Applied in the PV Power System

Item	Description
А	PV arrays
В	Inverter
С	Metering device
D	Utility grid

2.2 Main Circuit Description

Fig 2-2 shows circuit block diagram of SG10/12/15KTL inverters.

SG10/12/15KTL inverters are equipped with the same number MPPT for two DC inputs, which ensure that the maximum power can be utilized even different PV modules. IGBT three-level inverter circuit converts the DC power into AC power. This AC power is fed into the utility grid via five core terminals. Meanwhile the inverter is equipped with protective circuits to guarantee itself safe operation.

Additionally, a DC switch is integrated for safe disconnection of DC current. The inverter provides standard interface RS485 or optional interface Ethernet for communication. Inverters are also provided running records display and parameters configuration via human-computer interface –LCD display panel.

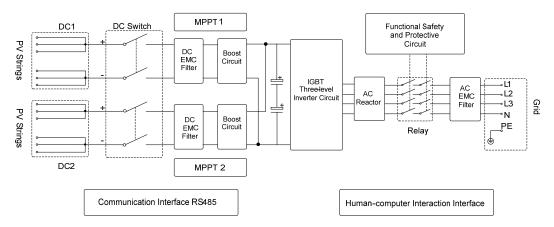


Fig 2-2 Main Circuit Diagram of Inverter

2.3 Product Description

2.3.1 Product Appearance



Fig 2-3 Product Description

No.	Name	Description
1	LCD display panel	Human-computer interaction interface for looking up running information and configuring parameters.
2	Air outlet	Hot air generated during running process is exhausted via the air outlet.
3	Handles	The handles are designed for transporting unit.
4	Air inlet	Entrance of cool air.
5	DC switch	During normal operation it is in "ON" state. It can shut down the inverter immediately in "OFF" position.
6	Connection terminals	They are DC input terminals, AC output terminal, RS485 communication terminal and Ethernet interface.

2.3.2 Dimensions of Inverter

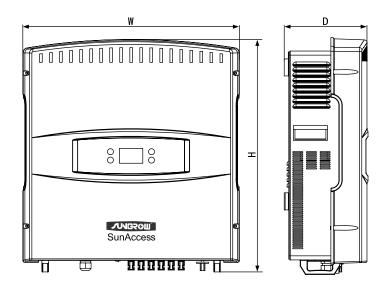


Fig 2-4 Outline Dimensions of Inverter

Table 2-1 Dimension Values

Туре	W(mm)	H(mm)	D(mm)	Net weight(kg)
SG10KTL	648	686	243	50
SG12KTL	648	686	243	50
SG15KTL	648	686	243	50

2.3.3 LCD Display Panel

As a friendly human-computer interface, on the front side LCD display panel consists of LED indicators, buttons and the LCD screen. Important system data (such as current power) can be accessed via the LCD screen. The parameters can be configured in the LCD by tapping the right two buttons.

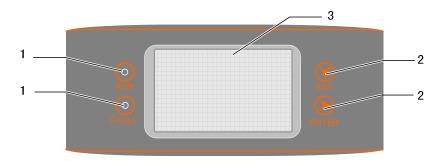


Fig 2-5 LCD Display Panel

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No.	Name	Description
1	LED indicators	"RUN" and "FAULT". Inverter current state can be known from the two indicators. Detailed definition is shown in Table 2-2.
2	Buttons	Navigate in the LCD menu, select values and so on. Detailed function is shown in Table 10-1.
3	LCD Screen	LCD screen can display the current state of inverter, current running information, history information and parameters to be set.

Table 2-2 Description of LED Indicator

LED State	Description
"RUN": on;	Inverter is feeding AC power to the utility grid.
"FAULT": off	
"RUN": off;	A malfunction happens;
"FAULT": on	or protection function triggers.
"RUN": off;	Inverter is not energized;
"FAULT": off	There is communication error between DSP and LCD.

2.3.4 DC Switch

The DC switch is designed for safely disconnecting the DC current if required.

The inverter works automatically when input and output meet the requirements. If you want to interrupt its running or if a malfunction occurs, it can be rotated to the "OFF" position and then the inverter will stop running.



Before restarting the inverter, rotate the DC switch to the "ON" position.

INSTALLATION AND MAINTENANCE INFORMATION

Just for Installer

$SG10KTL/SG12KTL/SG15KTL \quad \ \ \text{User Manual}$

3

Installation Flow

About This Chapter

This chapter demonstrates installation flow from unpacking to successful commissioning.

The following diagram shows the installation flow of inverter for installer. Please follow these procedures.

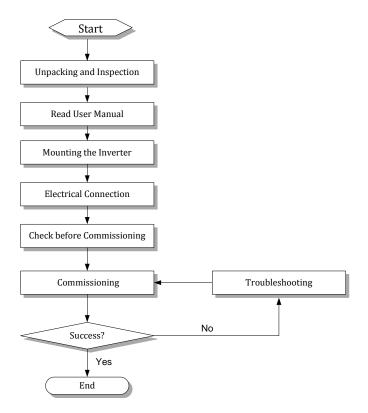


Fig 3-1 Installation Flow Chart

Table 3-1 Description of Installation Flow

Order	Description	Remark
1	Unpacking and Inspection	Section 4.1
2	Read this manual, especially the section on "safety instruction"	Chapter 1
3	Choose the best installation site	Section 5.1
4	Install the inverter against the chosen wall	Section 5.2
5	Connect inverter to PV arrays	Section 6.5
6	Connect inverter to utility grid	Section 6.6
7	Connect the PV system to ground	Section 6.7
8	Connect communication cable for inverter(optional)	Section 6.8
9	Examine before commissioning	Section 7.1
10	Start up inverter and configure corresponding parameters	Section 7.2

4

Unpacking and Storage

About This Chapter

This chapter illustrates unpacking and inspection after receiving the inverter unit. Additionally it gives instructions about storage.

4.1 Unpacking and Inspection

The unit is thoroughly tested and inspected strictly before delivery. Although sturdy packaging is used, damage may still occur during shipping.

- Check the packing for any visible damage upon receiving.
- Check the inner contents for damage after unpacking.
- Check the completeness of delivery contents according to the inner packing list.

If there is visible damage to the packaging or the inner contents, or if there is something missing, contact the unit dealer.

Do not dispose of the original packaging. It is the best choice to re-use it for inverter storage.

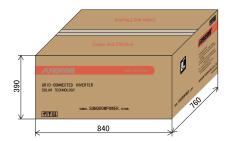


Fig 4-1 Single Inverter in Original Packaging Carton(unit: mm)

4.2 Moving the Inverter

In order to avoid damage to the inverter during moving, it is better to move inverter in original carton.

Pay attention to the weight. Proper device that can bear the weight is needed to avoid inverter damage or person injury when moving.



When moving the inverter, please follow the symbol instructions on the packaging box.

4.3 Identifying Inverter

A nameplate is attached to the side of the inverter and the carton respectively. It includes inverter type, along with unit technical specifications, certification marks and serial number which is available and identified by Sungrow.



Fig 4-2 Nameplate of Inverter SG15KTL

*Image shown here is indicative only. Actual product you receive may differ.

Item	Description
1	SUNGROW logo and product type
2	Technical data of inverter
3	Marks of certification institutions of inverter
4	Company name, website and origin

Table 4-1 Description of Icons on the Nameplate

Icon	Description
<u>\$</u>	Don't dispose of the inverter with the household waste.
Ţ <u>i</u>	Refer to the corresponding instructions.
TUV	TUV mark of conformity. The inverter is in compliance with directives of TUV.
CE	CE mark of conformity. The inverter is in compliance with directives of CE.

4.4 Delivery Contents

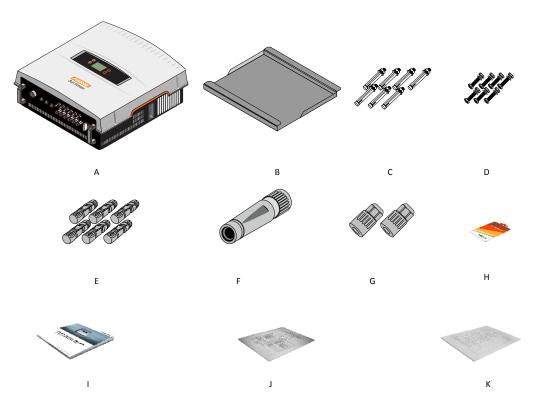


Fig 4-3 Delivery Contents

Item	Description
А	Inverter unit
В	It is used for mounting inverter onto the wall
С	Expansion bolts for fastening backplate onto concrete wall
D	Fastener set for installing backplate on metal frame
Е	PV input connectors, including positive and negative connectors
F	AC connector
G	Waterproof communication connector
Н	Quality certificate
1	User Manual, including installation instructions and operation instructions
J	Packing list
К	Product test report

4.5 Storage of Inverter

Where the inverter may not be installed immediately or inverter needs to be stored under certain condition, store the unit as the following indications:

- The unit must be packed into original carton and desiccant must be left inside. If the original packaging is not accessible, an equivalent carton which is able to support the unit weight and size can be used.
- The packing should be sealed by adhesive tape.
- The unit must be stored in a clean and dry place to protect against dust and moisture.
- The storage temperature should be always between -25 °C ~60 °C. And the storage relative humidity should be always between 0 and 95%.
- It is very important to keep the packing away from chemicals, Otherwise it will lead to corrosion.
- During the storage time, periodically check any visible damage by rats. Replace the packaging if necessary.
- The packaging should be kept upright.
- If there is more than one inverter to be stored, the maximum layers for original carton is three.
- After long term storage, local installer or service dept. of Sungrow should perform a comprehensive test before connecting the inverter into PV power system.

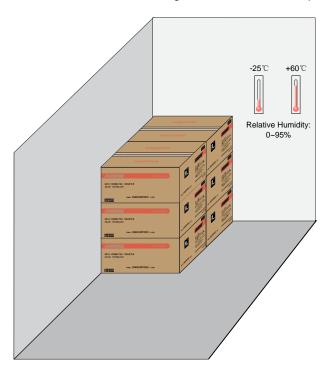


Fig 4-4 Example for Inverter Storage

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5

Installing Inverter against Wall

About This Chapter

This chapter provides information about choosing installation site and gives step-by-step procedures to install inverter onto the wall. And related safety instructions are also included.

5.1 Selecting Installation Location

Installation shall comply with local regulations and technical rules. Installation shall comply with the relevant instructions of AS 4777.1.

To make sure the unit optimal and safely operation later, guidelines to choose the suitable installation site are provided in the following. Selecting an optimal installation location for the inverter is decisive for its operating safety as well as it expected efficiency and service life.

- 1. Take the load capacity of the wall into account. The wall (such as concrete wall and metal structure) should be strong enough to hold the weight of the inverter over a long period of time.
- 2. Install the unit where is accessible to install, electrical connection or service.
- 3. Do not install the unit on wall of flammable materials.

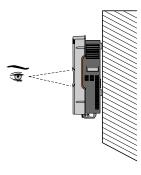


4. Do not install the inverter where contains flammable materials or flammable gas in the vicinity of the unit installation.



gas near the installation

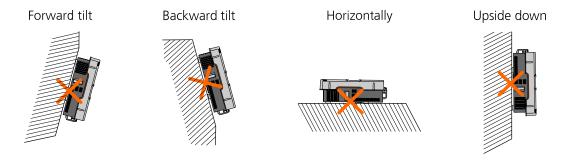
5. Install the unit at eye level for easily buttons operation and display read.



6. It is suggested that the inverter be installed vertically with upside up for good heat dissipation.



7. Never install the inverter horizontally, or with a forward tilt, or with a backward tilt or even with upside down.



- 8. The inverter unit with IP65 can be installed indoors or outdoors also.
- 9. The ambient temperature should range from -25°C to 60°C. When ambient temperature exceeds 45°C, the power output will reduce.
- 10. The relative humidity of chosen installation site should never exceed 95%. Moisture may result in corrosion and damage to the inner electronic components.

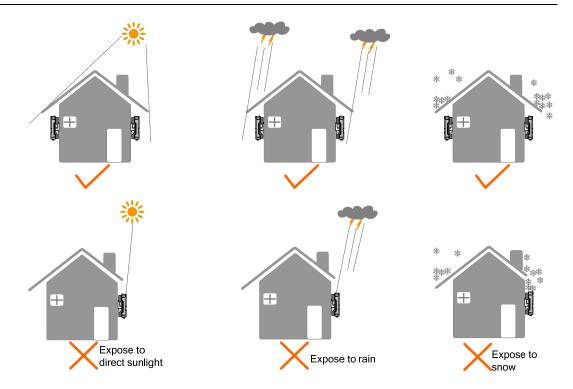




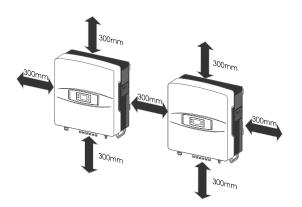
Max. relative humidity: +95% No condensina

11. Avoid exposing inverter to direct sunlight or rain or snow to extend its service life despite of IP65 protection degree. Shaded site of the building will be better. Exposure to the sun may cause additional internal heating which will cause power reducing.

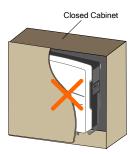
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12. Take enough space for convection into consideration during installing multiple inverters.



13. Do not install the inverter in a closed cabinet. Otherwise, the inverter will not operate normally.



- 14. Do not install inverter where children can reach.
- 15. Do not install inverter in living area. Noise may be produced during inverter running, which may affect your daily life.

5.2 Moving Inverter to Installation Site

If the inverter is to be installed, remove the unit from the packaging and move it to the chosen installation site. During the moving process, the following instructions should be obeyed.

- 1. Always remember the weight of SG10/12/15KTL inverters.
- 2. Grasp the equipment with both hands by means of handles.
- 3. Move the unit with the help of another person also or with the lifting device.
- 4. Do not release the equipment unless it has been secured to the wall firmly.

5.3 Installing the Inverter

Inverter is installed onto the wall via backplate in the packaging.

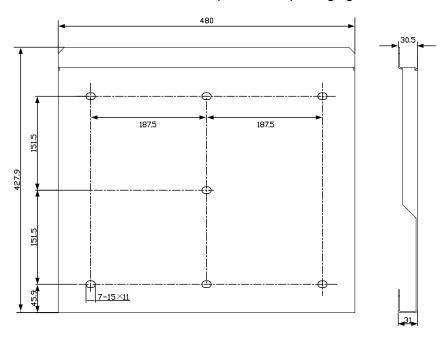


Fig 5-1 Dimensions of Backplate(unit: mm)

There are two sets of stainless fasteners supplied to attach backplate to concrete wall and metal frame.

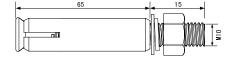


Fig 5-2 Dimensions of Expansion Bolt Set for Concrete Wall (unit: mm)

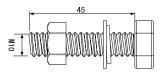


Fig 5-3 Dimensions of Fastener Set for Metal Frame(unit: mm)

For Concrete Wall

Step 1: Remove backplate and fasteners from the packaging.

Step 2: Place the backplate onto the chosen concrete wall and adjust it until it is in a horizontal position.

Step 3: Mark the positions to drill holes using the backplate as the template.

Step 4: Drill holes according to the marks you have made.



In order to avoid electrical shock or other injury, inspect existing electronic or plumbing installations before drilling holes.

Step 5: Attach the backplate to the wall firmly with the supplied expansion bolt set. The torque for fastening the nut is 35 Nm.

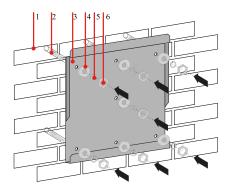


Fig 5-4 Fasten the Backplate against Concrete Wall with M10*80 Expansion Bolt Set

Item	Description
1	Concrete wall
2	Expansion cylinder
3	Backplate
4	Washer
5	Spring washer
6	Hexagonal socket nut

Step 6: Lift up the inverter above the backplate with the help of other people and then slide down, making sure that the two recesses on the back of the inverter and counterparts of the backplate engage perfectly, as Fig 5-5 shown.

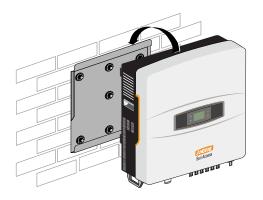
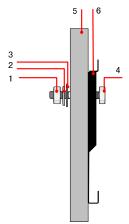


Fig 5-5 Installing the Inverter

On Metal Frame

If the chosen mounting location is metal frame, please follow the following steps to mounting inverter.

- **Step 1:** Get the supplied backplate from the packaging.
- Step 2: Choose the best installation site according to above requirements. Place the backplate onto the chosen metal frame and adjust it until it is in a horizontal position.
- **Step 3:** Mark the positions to drill holes by using the backplate as the template.
- Step 4: Drill seven holes at the marks you have made. If the shape of the metal frame doesn't fit the holes on the backplate, re-drill holes on the backplate of appropriate position according to the chosen frame.
- Step 5: Fasten the backplate against the wall with bolts and nuts. The dimensions of fasteners used in the following diagram are recommended. The torque for fastening the nut is 35 Nm.



No.	Description	Remark
1	Hexagonal socket nut	M10
2	Spring washer	
3	Washer	
4	Hexagonal bolt	M10*45
5	Metallic wall	
6	Backplate	

Fig 5-6 Fasten Backplate against Metal Frame with Bolts and Nuts

Step 6: Lift up inverter above the backplate with help of other people and then slide down to make sure that the two recesses on the back of the inverter fit perfectly together with the backplate, as Fig 5-7 shown.



Fig 5-7 Attaching Inverter onto Backplate

6

Electrical Connection

About This Chapter

This chapter proposes step-by-step procedures to perform electrical connection and related safety instructions.

Once the inverter is firmly attached to the appropriate location, it can be connected into the PV power system.



Improper operation during the wiring process can cause fatal injury to the operator or unrecoverable inverter damage.

Only qualified personnel can perform the wiring work.

Prior to any electrical connection, keep in mind that inverter has dual power supply. It is mandatory for technical personnel to wear personal protective equipments: helmet, footwear and gloves during the electrical work.

6.1 General Safety Instructions



All electrical installations must be in accordance with local and national electrical codes.



Only after receiving prior approval from the utility company and qualified personnel installing the inverter, should the inverter be connected to the utility grid.



All cables must be firmly attached, undamaged, properly insulated and adequately dimensioned.



These regulations should also be followed:

- The regulations related to the electricity fed into the grid
- The safety instructions related to the PV arrays

6.2 Overview of Electrical Installation

Electrical connections of the inverter include DC connection, AC connection and communication connection.

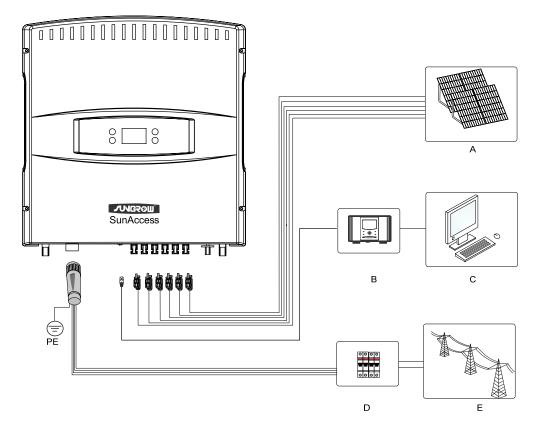


Fig 6-1 Electrical Connection Diagram

Item	Description	Remark
Α	PV arrays	The maximum open-circuit voltage of each PV string is 1000V.
В	SolarInfo logger	It can be ordered from Sungrow.
С	Remote PC	User uses this device to monitor the whole PV system.
D	AC circuit breaker	Used as a protective device during electrical connection. User equips this device according to maximum output voltage and current.
Е	Utility Grid	Rated AC voltage is 230V.

6.3 Terminals Description

All electrical terminals are located at the bottom of unit, as the following diagram shown. Enough space should be kept for electrical connection at the bottom of the inverter when choosing the installation site.

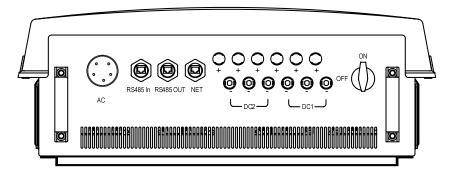


Fig 6-2 Terminals Description

6.4 Specifications of Cables

All cables for the PV power system are equipped with water-proof direct plug-in connectors. You'll find these connectors in the packaging.

For electrical connection in the PV power system, specification of all cables used should meet the following requirements.

Items		No.	Min. cross area (mm²)	Max. cross area (mm²)	Recommended value (mm²)
DC posi	tive cable	6	2.5	4	2.5
DC nega	ative cable	6	2.5	4	2.5
AC	L1	1	4	6	4
cable	L2	1	4	6	4
	L3	1	4	6	4
	N	1	4	6	4
	PE	1	4	6	4

6.5 Connecting Inverter to PV Arrays



Lethal voltage exists!

Cover PV array with opaque materials before DC electrical connection. When exposed to sunlight, PV array will output lethal voltage.

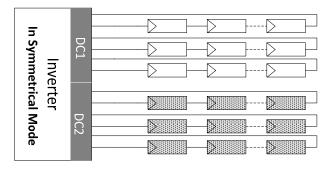
SG10/12/15KTL inverters have two PV input area DC1 input and DC2 input, each owning its MPP tracker. The two PV input can work in symmetrical mode or parallel mode, which can be set by LCD display menu (see "10.7.7 Set Work Mode").



The mode in which actual PV strings are connected and the mode that is set in the inverter LCD display menu should be identical. Otherwise inverter will not work normally.

For Symmetrical Mode

In symmetrical mode, the two input work independently, as the following diagram shown.





To make sure maximum DC power can be utilized, PV strings connected to individual input area should have a homogenous structure, including the same type, the same number, identical tilt and identical orientation.

Prior to connecting inverter to PV inputs, the following specifications should be met:

Туре	Total DC Power Limit for Inverter	DC Power Limit for Each Input	Open-circuit Voltage Limit for Each Input	Short-circuit Current Limit for Each Input
SG10KTL	10.4kW	5.2kW	1000V	25A
SG12KTL	12.5kW	6.3kW	1000V	25A
SG15KTL	15.6kW	7.8kW	1000V	25A

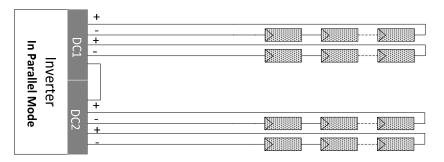


There is a risk of inverter damage! The following requirements should be met, otherwise they will lead to loss of any and all warranty rights.

- Make sure that the maximum short circuit current of each DC input is less than inverter allowable limit.
- Make sure that the maximum open voltage of each string is less than 1000V.
 Voltage over 1000V can damage the inverter.

For Parallel Mode

In parallel mode, the PV inputs can be connected in parallel, as the following diagram shown. One pair of DC terminals in DC1 input and DC2 input must be short-circuited.





To make sure maximum DC power can be utilized, All PV strings connected to inverter should have a homogenous structure, including the same type, the same number, identical tilt and identical orientation.

Prior to connecting inverter to PV inputs, the following specifications should be met:

Туре	Total DC Power Limit for Inverter	Open-circuit Voltage Limit for Each Input	Short-circuit Current Limit for Total Input
SG10KTL	10.4kW	1000V	50A
SG12KTL	12.5kW	1000V	50A

Туре	Total DC Power Limit for Inverter	Open-circuit Voltage Limit for Each Input	Short-circuit Current Limit for Total Input
SG15KTL	15.6kW	1000V	50A



There is a risk of inverter damage! The following requirements should be met, otherwise they will lead to loss of any and all warranty rights.

- Make sure that the maximum short circuit current of total DC input is less than inverter allowable limit.
- Make sure that the maximum open voltage of each string is less than 1000V. Voltage over 1000V can damage the inverter.

6.5.1 Assembling DC Cable to Connector

DC cables from PV strings should be equipped with DC connectors. Pairs of DC connectors are supplied in the scope of delivery.



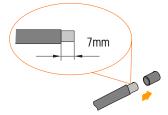
Make sure that all the DC cables to the inverter are not live before you start the electrical work.



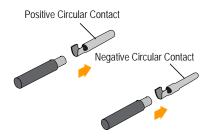
To maintain IP65 weatherproof function of inverter, only the supplied DC connectors or the connectors of the same protection class can be used.

The positive and negative connectors, marked with polarity symbols will be assembled with colored cables as the following procedures:

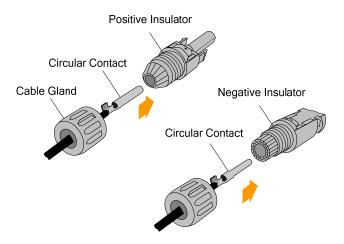
1: Strip off 7mm insulation layer from all DC cables.



2. Crimp cable ends into corresponding circular contacts with crimping pliers.



- 3. Lead cable through cable gland.
- 4. Insert the crimped-on circular contact into insulator until it snaps into place. And pull gently to check that it is correctly engaged.



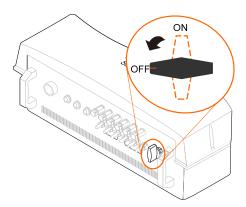
5. Screw the cable gland to front insulator with tightening torque 2 Nm.

6.5.2 Wiring Procedure

PV Connection of Symmetrical Mode

Connect the inverter to PV arrays as the following procedures:

1. Manually rotate the DC switch at the bottom to the "OFF" position.



2. Check the connection cable of PV string for the correct polarity and that the short circuit voltage does not exceed inverter input limit 1000V, even under the lowest

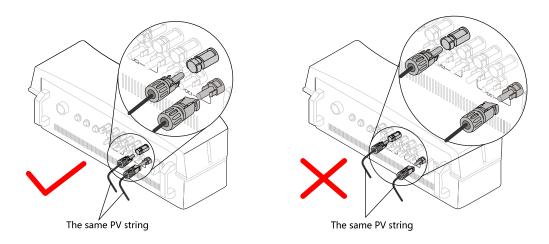
operating temperature. Refer to module specification supplied by module manufacturer.

3. Check this PV string for insulation failure.

Measure the DC voltage between the positive terminal of and Earth and the DC voltage between the negative terminal and Earth. If the two voltages are constant and not zero, there is an insulation failure somewhere in this PV string. Solve the insulation failure if required before connecting this PV string to the inverter.

4. Plug the positive and negative DC connectors into corresponding terminals until there is an audible sound.

It must not be connected to the different input areas for this PV string

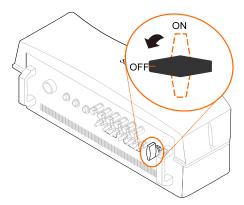


5. Connect other PV strings in the same procedures if necessary. Unused DC terminals should be sealed.

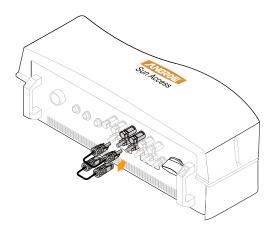
PV Connection of Parallel Mode

Connect the inverter to PV arrays as the following procedures:

1. Manually rotate the DC switch at the bottom to the "OFF" position.



2. The two input areas are short connected as the following indications before any PV string connection.



- 3. Check the connection cable of PV string for the correct polarity and that the short circuit voltage does not exceed inverter input limit 1000V, even under the lowest operating temperature. Refer to module specification supplied by module manufacturer.
- 4. Check this PV string for insulation failure.

Measure the DC voltage between the positive terminal of and Earth and the DC voltage between the negative terminal and Earth. If the two voltages are constant and not zero, there is an insulation failure somewhere in this PV string. Solve the insulation failure if required before connecting this PV string to the inverter.

- 5. Plug the positive and negative DC connectors into corresponding terminals until there is an audible sound.
- 6. Connect other PV strings in the same procedures if necessary. Unused DC terminals should be sealed.

6.6 Connecting Inverter to AC Grid

WARNING

Only after receiving prior approval from the utility company, should you connect the inverter to the local utility grid.



The grid should meet the following requirements. Otherwise the inverter will not work.

Grid Voltage

184~276V

Grid Frequency

47~53Hz

With an integrated universal current-sensitive residual-current monitoring unit inside, the inverter can automatically distinguish the fault currents from normal capacitive leakage currents. However if an external RCD or residual current breaker is mandatory, the switch must trigger at a failure current of 100mA or higher.

6.6.1 Assembling AC Cables to Connector

The inverter is equipped with water-proof direct plug-in connectors for AC connection, which mate with AC terminals at the bottom of the inverter.



NOTE

All AC cables should be equipped with correctly colored cables for distinguishing. Please refer to related standards about wiring color.

Assembling Procedure

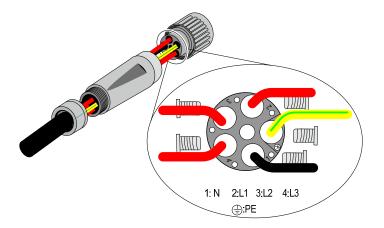
Step 1: Unscrew the water-proof terminal in the following direction.



Step 2: Insert appropriately sized AC cables through water-proof terminal.

Step 3: Strip off insulation layer of all AC cables. The length of strip insulation is approximate 8mm.

Step 4: Fix all cables ends to the corresponding terminals with the torque of 1Nm according to markings on the connector, especially "PE" cable. If a phase wire is connected to the "PE" terminal, it may permanently destroy the inverter.



- Step 5: Pull cables outwards to confirm whether they are installed firmly.
- **Step 6:** Combine the two front-end parts together with the torque of 2 Nm.
- **Step 7:** Tighten the water-proof terminal with the torque of 5 Nm in opposite directions.

6.6.2 AC Wiring Procedure



Assignment of AC cables should be paid attention to, especially "PE" wire.

- **Step 1:** Assemble AC cables to connector supplied. See "6.6.1 Assembling AC Cables to Connector".
- **Step 2:** Make sure that the AC and DC circuit breaker are disconnected.
- Step 3: Connect phase cables and "N" cable to AC circuit breaker.
 - Plug AC connector to corresponding AC terminals.
 - Screw AC cables except the "PE" cable to the AC circuit breaker.
- Step 4: Connect AC circuit breaker to utility grid.
- Step 5: Make sure that all AC cables are firmly installed.

6.7 Grounding the Inverter



Because of the transformer-less design of the inverter, the DC positive pole and DC negative pole of the PV arrays are all not permitted to be grounded.

All non-current carrying exposed metal parts of the equipment and other enclosures in the PV power system should be grounded (e.g., PV arrays frame and inverter enclosure).

Where there is only one inverter in the PV power system, connect "Ground" cable to the installation ground.

Where there are multiple inverters in the PV power system, connect "Ground" cables of all inverters and mounting frame of PV arrays to the same copper bus bar. In this way, it will establish equipotential connection.

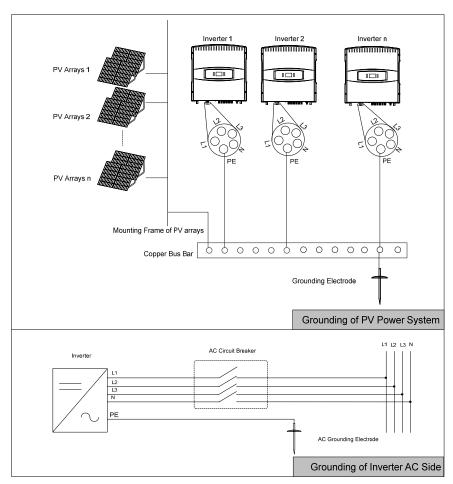


Fig 6-3 Grounding for Inverter

6.8 Communication Connection

6.8.1 Communication Types

The following RS485 communication type can be used to transfer the monitored information from inverter to a PC with monitoring software (such as SolarInfo Insight), or to data logging device (such as SolarInfo Logger).

- Where there is only one inverter, a RS485 cable with RJ45 connector enables connection between inverter and PC.
- Where there is more than one inverter, all inverters are connected to PC in a
 daisy chain. The first inverter in the chain must be terminated with a resistor of
 120 Ohm. And shielding layer of RS485 cable should be single-point grounded.
- A converter such as RS485-232 converter or SolarInfo Logger, which converts 485 to 232 signal, is needed between inverter and PC.

6.8.2 RS485 Communication Connection

RS485 is the standard communication choice for inverter.

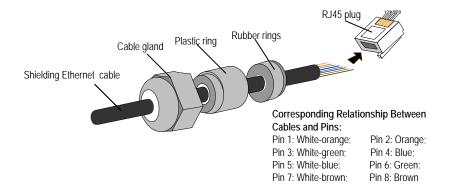
The maximum number that inverters are connected in the daisy chain depends on converter and other factors. Please refer to converter's manual to obtain the limit.

RS485 terminals on the bottom of the inverter are RJ45 sockets. First prepare communication cable and RJ45 plug. Meanwhile to guarantee inverter protection degree, there are waterproof communication connectors supplied in the scope of delivery.

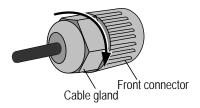


RS485 cable's requirements to ensure quality of communication:

- Shielding Ethernet cable
- Twist-pair type
- 1. Lead shielding Ethernet cable through cable gland and inner rings.
- 2. Use the Ethernet crimper to crimp the cables and connect cables to RJ45 plug according to TIA/EIA 568B.



- 3. Pull cables outwards to confirm whether they are fastened firmly.
- 4. Insert the RJ45 plug into the front plug connector until it makes a clicking sound.
- 5. Tighten the cable gland with appropriate torque.



- 6. Now perform RS485 communication connection as the diagram shown below.
 - Connect connector of one cable end to RS485 terminal on the bottom of the inverter. Make connector and RS485 terminal engage and rotate clockwise about 60 degrees.
 - Connect the other end of cable to other devices. Communication terminal definition is referred to device manual.

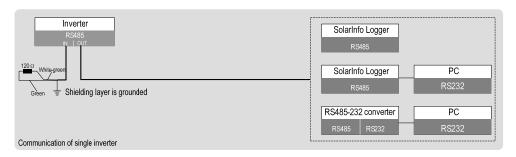


Fig 6-4 One Inverter Connected to PC or SolarInfo Logger

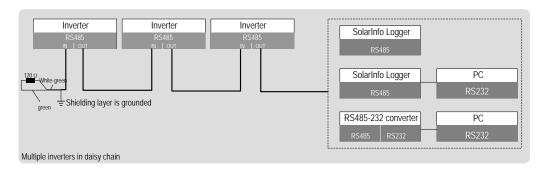


Fig 6-5 Multiple Inverters Communication with Other Devices

7. Verify the communication connection and configure communication parameters.



If there is more than one inverter to communicate with a PC or a data logger, it is crucial to configure communication parameters of each inverter. See "10.7.10 Set Communication Parameters".

SolarInfo logger and RS485-232 converter are optional parts and can be ordered from Sungrow.

Commissioning

About This Chapter

This chapter demonstrates how to check before commissioning and operation procedures.

Commissioning is a critical part for a well-installed PV system, which can protect against fires, injury and electrical shock.

7.1 Inspection before Commissioning

Before starting the inverter, you should check the following items for requirements.

- 1. Inverter unit is accessible for operation, maintenance and service.
- 2. Re-check that the inverter is firmly installed on to the wall.
- 3. Room for ventilation well is provided for one inverter or more than one inverter.
- 4. There is nothing left on top of the inverter unit.
- 5. Inverter and accessories are correctly connected.
- 6. Cables are routed in safe place or protected against mechanical damage.
- 7. Specification of AC circuit breaker is reasonable.
- 8. Terminals not used underneath the inverter are sealed.
- 9. Warning signs & labels suitably affixed and durable.

7.2 Commissioning Procedure

If all checking items above meet demands, precede the following procedures to start up the inverter for the first time.

- 1. Close external AC circuit breaker.
- 2. Rotate DC switch to "ON" position.

Suppose that there is sufficient sunlight and enough DC power. PV arrays initialize and supply DC power to inverter. And the LCD display is activated.

3. Language screen will prompt first once activated. Perform language settings with the right two buttons. Detailed button functions can be referred to "10.1 Description of Button Function".

Shortly press button to choose language. Confirm the settings by long pressing button button button

Language [0] English [1] Deutsch [2] Française [3] Italiano

4. Configure time properly as prompted in the display. Time settings is very important, which directly affects data logging.

Shortly press button to move cursor and shortly press button to scroll up time value. Confirm the settings by long pressing button to scroll up

Time Date: 09/11/18 Time:18:35:55

5. Select the country code according to the inverter's installation country. Each country code represents corresponding local protective parameters that have been preset before delivery.

Shortly press button to choose country code. Confirm the settings by long

pressing button enter is installed where country code is not include, please choose item "Other" and manually set the protective parameters. Detailed information please refer to "10.7.9 Set Protective Parameters".

Country setting		
[0] GB	[1] DE	
[2] FR	[3] IT	
[4] ES	[5] AT	
[6] AU	[7] CZ	
[8] BE	[9] Other	

The description of country codes is listed below:

Country Code	Full Name	Country Code	Full Name
GB	Great Britain	DE	Deutschland
FR	France	IT	Italia
ES	Espaňa	AT	Austria
AU	Australia	CZ	Czech
BE	Belgium	Other	Countries not included

If the country code is not set correctly during commissioning, reset the protective parameters as dictated in "10.7.9 Set Protective Parameters". Otherwise, there may be serious result.

The default country code is "DE". Inverters are in conformity with Low Voltage Directive (VDE-AR-N 4105). If you choose "DE" country code, you also need to choose Low Voltage Directive.



- 6. After configuring the three screens, inverter will enter into start-up process.
- 7. Observe status of LED indicators and the LCD screen.



If inverter's commissioning fails, the "FAULT" indicator will be lit and "State" in the LCD screen will display type of malfunction. In this case malfunction must be removed and then repeat 1 to 7.

If inverter's commissioning succeeds, the "RUN" indicator will be lit and "States" in the LCD screen will display "RUN".

- 8. According to the actual PV strings connection mode, choose the same mode in the inverter by the LCD display menu (see "10.7.7 Set Work Mode").
- 9. Rotate DC switch to the "OFF" position again to make the work mode settings valid.
- 10. Rotate DC switch to the "ON" position to active inverter normal operation.



Disconnecting Inverter

About This Chapter

This chapter introduces the procedures to disconnect inverter from utility grid and PV arrays.

For maintenance work or any service work, inverter must be switched off. In normal operation, switching off is not necessary.

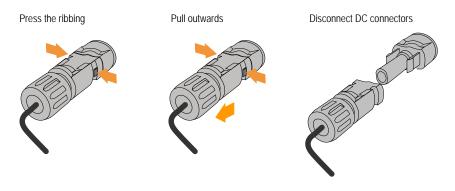
In order to disconnect the inverter from the AC and DC power sources, you should proceed with the following procedures. Otherwise you will be exposed to lethal voltages or the inverter will be damaged.

- 1: Disconnect the external AC circuit breaker and prevent it from connecting again.
- 2: Rotate the DC switch to the "OFF" position.



Please strictly follow the sequence of the above procedures. Otherwise it will lead to unrecoverable inverter damage.

- 3: Wait about ten minutes until the capacitors inside the inverter have discharged.
- 4: Measure to confirm AC output of inverter at the AC circuit breaker is voltage free.
- 5: Pull AC connector out of the inverter.
- 6: Release the locking part of DC connectors by pressing on the ribbing of the locking hooks with nipper pliers and pull outwards.



9

Troubleshooting and Maintenance

About This Chapter

This chapter illustrates troubleshooting and daily maintenance.

9.1 Troubleshooting

9.1.1 Troubleshooting of LED Indicator

See "Table 2-2 Description of LED Indicator" for definition of LED's states.

Type of fault	Troubleshooting
LED indicators and	Disconnect AC circuit breaker.
LCD cannot be lit	2. Rotate the DC Switch to the "OFF" position.
	3. Check the polarity of DC input.
"RUN" indicator	Disconnect AC circuit breaker.
goes out	2. Rotate the DC Switch to the "OFF" position.
	3. Check the correctness of electrical connection of inverter. See "6 Electrical Connection".
	Check whether the voltage of DC input exceeds start voltage of inverter.
	5. If all above conditions are OK, please contact with Sungrow.
"Fault" indicator is lit	1. There is a fault which is not removed yet.
	2. Perform troubleshooting in according to fault type in LCD screen. See "9.1.2 Troubleshooting of Faults in LCD Screen".
	3. If it cannot be solved, please contact with Sungrow.

9.1.2 Troubleshooting of Faults in LCD Screen

Type of fault	Troubleshooting
Vdc-high	Disconnect AC circuit breaker.
	2. Rotate the DC Switch to the "OFF" position.
	3. Check the voltage of DC side.
	4. Restart the inverter until the DC voltage return to allowable range.
Vac-low	Disconnect AC circuit breaker.
	2. Rotate the DC Switch to the "OFF" position.
	3. Check the voltage of grid side.
Vac-high	4. If local grid condition exceeds AC requirements of inverter, reset the protecting parameters. See "10.7.9 Set Protective Parameters".
	And if local grid voltage exceeds the upper limit value of "Vgrid-max", or if local grid voltage is under the lower limit value of "Vgrid-min", please contact your local electricity company to adjust the grid voltage.
	5. If the fault still exists, please contact with Sungrow.

Type of fault	Troubleshooting
F-fault	Disconnect AC circuit breaker.
	2. Rotate the DC Switch to the "OFF" position.
	3. Check the frequency of grid side.
	4. If local grid condition exceeds AC demands of inverter, reset the protective parameters. See "10.7.9 Set Protective Parameters".
	And if local grid frequency exceeds the upper limit value of "Fgird-max", or if local grid frequency is under the lower limit value of "Fgrid-min", please contact your local electricity company to adjust the grid frequency.
	5. Close AC circuit breaker and rotate the DC switch to the "ON" position.
	6. If the fault can not be solved, please contact Sungrow.
PM-fault	If this malfunction occurs, the reasons are very complicated.
	Disconnect AC circuit breaker.
	2. Rotate the DC Switch to the "OFF" position.
	3. Check the temperature of heat sink. If its temperature exceeds 80℃, restart the inverter until it recovers to environment temperature.
	4. Recover DC switch to the "ON" position.
	5. Close AC circuit breaker.
	6. If this malfunction happens again, please contact Sungrow.
No-grid	Check whether AC circuit breaker is off.
	Check whether AC cables are all firmly connected.
	3. Check whether grid is cut off.
	4. If all conditions are OK and this malfunction still occurs in the LCD screen, please contact Sungrow.
Temp-flt	Check whether AC output power exceeds rated power too much.
	2. Check whether fans work normally and whether there are some abnormal from fans. Otherwise please replace broken fan. See "9.2.2 Replace Fan".
	3. Clean air grills of outlet. See "9.2.3 Clean Air Inlet and Outlet".
Com-err	I. If this malfunction happens, wait for a while and observe whether fault can be cleared by the inverter itself.
	2. Otherwise perform the command "Stop" or rotate DC switch to "OFF" position.
	3. Perform the command "Start" to restart the inverter or rotate DC switch to "ON" position.
	4. If this malfunction still exists, please contact Sungrow.



If you have any problems in operating on the inverter, please contact us:

Service hotline: +86 551 532 7834/532 7845

Email: service@sungrow.cn

We need the following information to provide you the best assistance:

- Type of the inverter
- Serial number of the inverter
- Fault name
- Brief description of the fault phenomenon

9.2 Maintenance



Disconnect the inverter from grid and then PV arrays before any maintenance work.

Lethal voltage still exists in the inverter. Please wait at least ten minutes and then perform maintenance work.

9.2.1 Clean Fan

There are four fans in the inverter for ventilation. It is suggested that fans are cleaned every half year.

Procedure:

- Step 1: Disconnect the connection of output and input side.
- Step 2: Wait for at least ten minutes.
- **Step 3:** Dismantle inverter in the reversed direction of "Installation procedure".
- **Step 4:** Loosen the seven fixed screws on the back of the inverter.
- **Step 5:** Clean the fan with soft brush or vacuum cleaner.
- **Step 6:** Reinstall the inverter onto the wall.
- Step 7: Re-connect the inverter.
- **Step 8:** Restart the inverter.

9.2.2 Replace Fan

If there is "Temp-flt" and abnormal noise, please replace the fan. This task should be performed by technician.

Procedure:

- **Step 1:** Disconnect the connection of the output and input side.
- **Step 2:** Wait for at least ten minutes.
- **Step 3:** Dismantle inverter in the reversed direction of "Installation procedure".
- Step 4: Refasten the seven fixed screws on the back of the inverter.
- **Step 5:** Dismantle the metal panel which holds the fans.
- Step 6: Disconnect the connection of the fan.
- Step 7: Replace the broken fan.
- Step 8: Reinstall the inverter onto the wall.
- Step 9: Re-connect the inverter.
- **Step 10:** Restart the inverter.

9.2.3 Clean Air Inlet and Outlet

A huge amount of heat is generated in the process of running the inverter. The inverter adopts a controlled forced-air cooling method.

In order to maintain good ventilation, please check whether there is anything blocking the air inlet and outlet.

Clean the air inlet and outlet with soft brush or vacuum cleaner if necessary.

9.2.4 Battery Maintenance

There is a button battery on the inner LCD PCB board. It may need to be serviced when it comes to service life.

- **Step 1:** Disconnect the connection of the output and input side.
- Step 2: Wait for at least ten minutes.
- **Step 3:** Loose screws of inverter upper lid.
- **Step 4:** Check that there is no voltage existing inside with appropriate test device.
- **Step 5:** Replace the button battery.

The following requests should be obeyed during the battery maintenance.

- Servicing of batteries should be performed or supervised by personnel knowledgeable about batteries and the required precautions.
- When replacing batteries, replace with the same type and number of batteries or battery packs.
- Do not dispose of batteries in a fire. The batteries may explode.
- Do not open or damage batteries. Released electrolyte is harmful to the skin and eyes. It may be toxic.
- A battery can present a risk of electrical shock and high short-circuit current. The following precautions should be observed when working on batteries:
 - Remove watches, rings, or other metal objects.
 - Use tools with insulated handles.
 - Wear rubber gloves and boots.
 - Do not lay tools or metal parts on top of batteries.
 - Disconnect charging source prior to connecting or disconnecting battery terminals.
 - Determine if battery is inadvertently grounded. If inadvertently grounded, remove source from ground. Contact with any part of a grounded battery can result in electrical shock. The likelihood of such shock can be reduced if such grounds are removed during installation and maintenance (applicable to equipment and remote battery supplies not having a grounded supply circuit).

OPERATION INFORMATION

For User and Installer

10

Operation of LCD Display Panel

About This Chapter

This chapter shows operation of LCD menu via buttons to check the records in the inverter and configure the parameters of the inverter.

10.1 Description of Button Function

Inverter offers two buttons for the user to look up running information and configure parameters. The two buttons have multiple functions. Users should know the button functions and how to operate before any operation onto inverter.

Table 10-1 Button Function

Name	Operation	Description
« ESC »	Press less than two seconds	Move upwards or downwards, or increase setting value. In the following text, it is called "shortly press".
	Press more than two seconds	Return to parent screen or cancel the command. In the following text, it is called "long press".
" ENTER"	Press less than two seconds	Move left or right, or turn pages. In the following text, it is called "shortly press".
	Press more than two seconds	Enter into the sub-screen or confirm the command. In the following text, it is called "long press enter".



The background illumination of the LCD screen will go out to save power if there is not button operation after one minute. You can activate it by pressing any button.

10.2 Operation Mode of Inverter

Here illustrates the operation modes of inverter.

Stop

The inverter is shut down.

Stand-by

Inverter will enter into Stand-by mode is entered for insufficient input power. In this mode the inverter will wait until the DC voltage recovers in standby time (set by user, see "10.7.8 Set Running Parameters").

Run

After being energized, the inverter tracks the PV arrays' maximum power point (MPP) and converts DC power to AC power. This mode is the normal mode.

Fault

If a fault occurs, the inverter will automatically stop operation, trigger the AC relay and display the fault type in the LCD screen with the "FAULT" indicator lit.

Once the fault is removed in recovery time (set by user, see "10.7.8 Set Running Parameters"), the inverter will automatically resume running.

Key-stop

The inverter will stop operation by manual "stop" through LCD menu.

10.3 Overview of Operation Menu

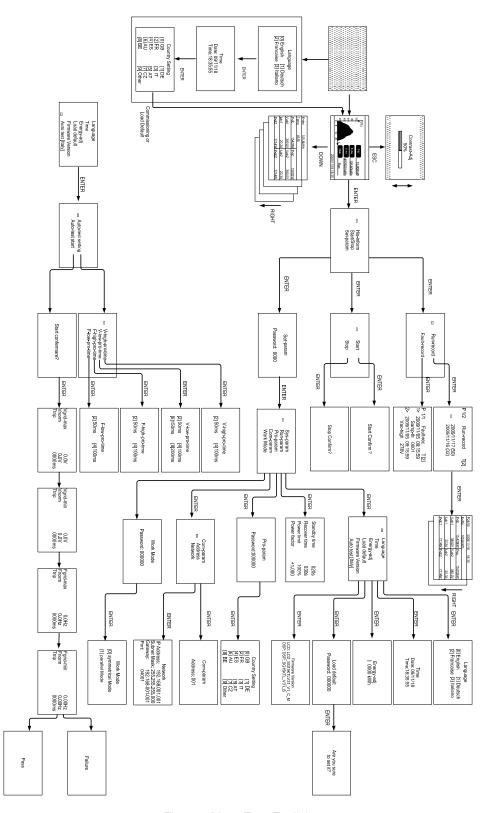
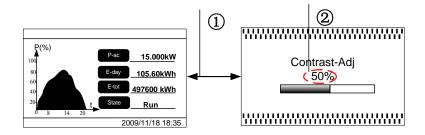


Fig 10-1 Menu Tree-English

10.4 Adjust Contrast



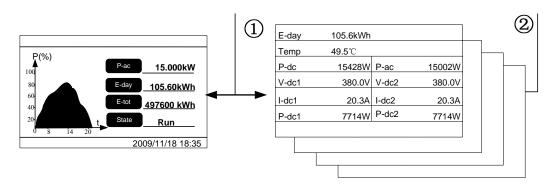
- ①: Long press button "so" to enter into the "Contrast-adj" menu from the default menu.
- ②: Shortly press button " so increase the setting value and shortly press button "enter" to decrease the value.



The contrast value ranges from 0 to 100. The recommended value is 50 or 60.

10.5 Check Running Information

In the default screen, there is some basic information about the inverter. If you want to know more information, you can operate as follows.

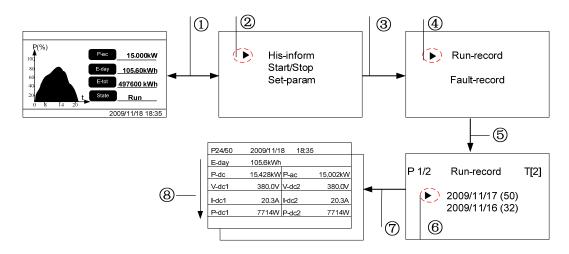


- 1: Shortly press button "ESC" or "ENTER" to enter into the four running information screens.
- ②: Shortly press button "ENTER" to turn screens between the four screens.

10.6 Check History Information

The running record and the fault record are stored in the inverter.

Check Run-record

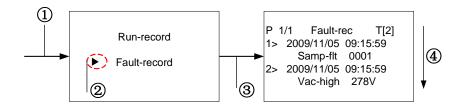


- ①: Long press button "enter" to enter into main control screen.
- ②: Shortly press button "so nove arrow to item "His-inform".
- ③: Long press button "ENTER" to enter into sub-screen of "His-inform".
- 4: Shortly press button "Esc" to move arrow to item "Run-record".
- ⑤: Long press button "ENTER" to enter into sub-screen.
- ⑤: Shortly press button " is " to move arrow to history time you want to check.
- (7: Long press button "enter" to enter into sub-screen.
- 8: Shortly press button "ENTER" to turn screens.

Check Fault-record



The inverter can only store at most 20 latest fault records.



- ①: Enter into the "Fault-record" screen, following operation ① \sim ③ in "check run-record " above.
- ②: Shortly press button " so nove arrow to item "Fault-record".
- ③: Long press button "ENTER" to enter into its sub-screen.
- 4: Shortly press button "emer" to move screens if there is more than one screen.

Table 10-2 Fault Description

Fault type	Explanations
Vdc-high	DC voltage exceeds the allowable value
Vac-high	Grid voltage exceeds the setting value of "Vgrid-max"
Vac-low	Grid voltage is less than the setting value of "Vgrid-min"
lac-high	AC power overloads
F-fault	Grid frequency is abnormal
No-grid	Island or grid is unavailable
PM-fault	Malfunctions of the IGBT power module occur
Temp-flt	Temperature inside the inverter is too high
Com-err	Fault of communication occurs between LCD and DSP
Earth-flt	There is leakage current in the AC side
Bus-high	The inner DC bus(boost output) voltage is too high
Bus-low	The inner DC bus (boost output) voltage is too low
Samp-flt	Malfunction occurs in the sampling circuit
DC inject	DC component of output Current is too high
Relay-flt	Malfunction of AC relay occurs
RISO-flt	Ground impendence of PV arrays is too low.
ENS-err	Malfunction of ENS chip occurs

10.7 Set Parameters

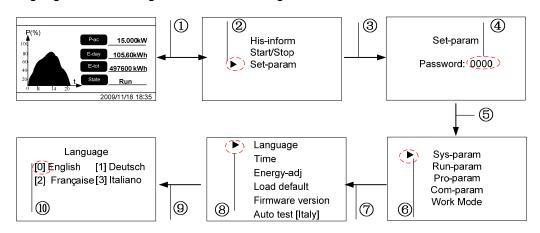


If you want to set inverter's parameters, you have to input correct password.

The default password is 1111.

10.7.1 Set Language

The inverter supports four different languages: English, German, France and Italian. Language can be configured as the following indication.

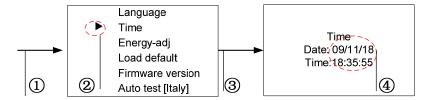


- ①: Long press button "ENTER" to enter into main control screen.
- ②: Shortly press button "Set-inform".
- ③: Long press button "EMER" to enter into the screen of password.
- 4: Shortly press "ENTER" to move right and shortly press button "ESC" to set the correct password 1111.
- ⑤: Long press button "ENTER" to enter into parameters setting screen.
- ⑥: Shortly press button " to move arrow to item "Sys-param".
- ①: Long press button "ENTER" to enter into sub-screen.
- 8: Shortly press button "so move arrow to item "Language".

- 9: Long press button "ENTER" to enter into sub-screen.
- (ii): Shortly press button "see" to select the number that represents language and then confirm the selection.

10.7.2 Set Time

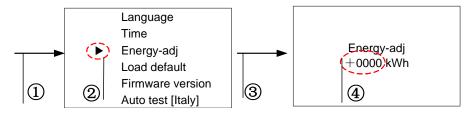
If there is deviation between the time in the default screen and your local time, you should perform the operation "set time". Clock is 24-hour format.



- ①: Enter into the "Time" screen following operation ①~⑦ in "Set language" above.
- ②: Shortly press button "Esc" to move arrow to item "Time".
- ③: Long press button "enter" to enter into sub-screen.
- 4: Shortly press button "emer" to move cursor and shortly press button "emer" to set the value.

10.7.3 Set Deviation of E-tot

If the accumulative value of "E-tot" by inverter has deviation from the value in the external metering device, you should adjust the parameter "energy-adj".



- ①: Enter into the "Energy-adj" screen following operation ①~⑦ in "Set language" above.
- ②: Shortly press button "so move arrow to item "Energy-adj".
- ③: Long press button "ENTER" to enter into its sub-screen.

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4: Shortly press button "ENTER" to move cursor and shortly press button "ESC" to set the value.



The positive symbol "+" can also be changed to negative symbol "-".

The adjustable range is from -9999~+9999 kWh.

(Energy-adj value)= (Real measured value)-(E-tot reading value).

10.7.4 Load Default



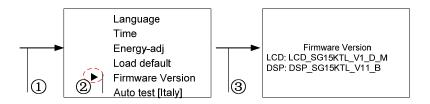
If you perform the operation "Load default", all history accumulated information will unrecoverable cleared and all parameters will return to the default value except protective parameters and time.



- ①: Enter into the "Load default" screen, following operation $\bigcirc \sim \bigcirc$ in "Set language" above.
- 2: Shortly press button " to move arrow to item "Load default".
- ③: Long press button "ENTER" to enter into sub-screen.
- 4: Shortly press button " to input the password "111111".
- (5): Long press button "ENTER" to confirm the command.

10.7.5 Check Firmware Version

User can not set this parameter.



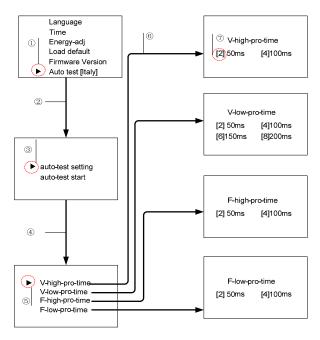
10.7.6 Auto Test (Only for Italy)

According to the requirements from Italian user, inverter also provides for Italian operation to verify the validity of functions about over-voltage protection, under-voltage protection, over-frequency protection and under-frequency protection.

After choosing the four thresholds: V-high-pro-time, V-low-pro-time, F-high-pro-time and F-low-pro-time, user performs the command "Auto-test start". And then the inverter will automatically carry out four protective functions in turn. Finally test result will come into being.

In order to perform auto test, please follow the procedures below:

Auto test setting



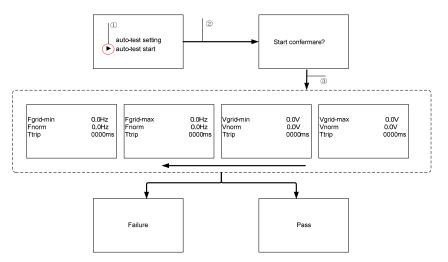
- ①: Enter into the "Auto test [Italy]" screen, following operation ①~⑦ in "Set language " above. Shortly press button " to move arrow to item "Auto test [Italy]".
- ②: Long press button "enter" to enter into sub-screen.
- ③: Shortly press button "Esc" to move arrow to item "Auto-test setting".

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- 4: Long press button "ENTER" to confirm the command.
- ⑤: Shortly press button " Esc " to move arrow to the setting item.
- ©: Long press button "enter" to enter into the setting screen.
- ⑦: Shortly press button "ESC" to move cursor among the numbers and then long press button "ENTER" to confirm the selection.
- 8: Configure other items in the same way. Otherwise the threshold is the default.

Auto-test start

After the operation of "auto-test setting", user can start auto-test.



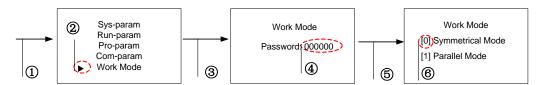
- ①: Enter into the "Auto-test start" screen, following operation ①~③ in "Auto-test setting" above. Shortly press button " to move arrow to item "Auto-test start".
- ②: Long press button "enter" to enter into sub-screen.
- ③: Long press button "ENTER" to confirm the command

After confirming the "Auto-test start" command, inverter will check the protective functions one by one.

An explanation about the process of one protective function auto-test. "Vgrid-max" is the protective parameter that has been set before delivery. "Vnorm" is the current voltage of the utility grid. "Ttrip" is the time from performing auto-test operation to inverter stop running. If the final value of "Ttrip" is less than the setting "V-high-pro-time", it means that this protective function is valid.

10.7.7 Set Work Mode

Inverter supports symmetrical mode and parallel mode of PV strings. It can be set as the following procedures.

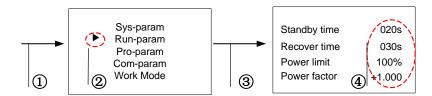


- ①: Enter into parameters setting screen, following operation ① \sim ⑤ in "Set language".
- ②: Shortly press button "Esc" to move arrow to item "Work Mode".
- ③: Long press button "enter" to enter into sub-screen.
- 4: Shortly press button "enter" to move cursor and shortly press button "esc" to set password 111111.
- ⑤: Long press button "ENTER" to enter into sub-screen.
- ⑥: Shortly press button " to choose work mode.
- 7: Long press button "ENTER" to confirm the settings.

NOTE

Work mode will be valid until the inverter is re-energized again by rotating DC switch to the "OFF" position and then to the "ON" position. The default work mode is symmetrical mode.

10.7.8 Set Running Parameters



- ①: Enter into parameters setting screen, following operation ① \sim ⑤ in "Set language".
- ②: Shortly press button " to move arrow to item "Run-param".
- ③: Long press button "enter" to enter into sub-screen.
- 4: Shortly press button "ENTER" to move cursor and shortly press button "ESC" to set parameters.



"Standby time" is the time from inverter starting to initialize to inverter feeding power to grid. This parameter ranges from 20s to 255s. And the default value is 20s.

"Recover time" is the time from the point that the fault is cleared to inverter recovering to feed power to grid. It ranges from 30s to 300s. And the default value is 30s.

"Power limit" ranges from 0 to 100. When the "Power limit" is set as 0, the inverter will enter into "key-stop" state.

Power factor's range: -1.000~-0.900 and +0.900 ~+1.000.

10.7.9 Set Protective Parameters

These protective parameters are designed for the limit value that can trigger the protective functions of the inverter.

In order to ensure realization of protective functions, these protective parameters have been configured before delivery according to different countries utility grid requirements.

If the inverter installation country is not included in, installer should choose "Other" and set corresponding protective parameters thresholds according to the following table.



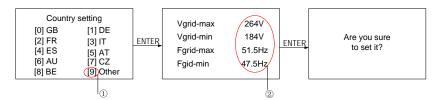
Wrong selection of the country settings may cause a breach of the type-certificate marking. The country settings must be in accordance with the inverter installation country.



- ①: Enter into parameters setting screen, following operation①~⑤ in "Set language".
- ②: Shortly press button "see" to move arrow to item "Pro-param".
- ③: Long press button "ENTER" to enter into sub-screen.
- 4: Shortly press "ENTER" to move cursor right and shortly press button "ESC" to input password 091030.
- ⑤: Long press button "enter" to enter into sub-screen.
- ⑤: shortly press button " [™] to select the right country code.

If the inverter installation country is not included in, installer should choose "Other" and set corresponding protective parameters according to the inverter installation country requirement, not exceeding ranges in the below table.

- 1: Shortly press button "Esc" to move cursor to item "Other" and long press button "Enc" to confirm selection.
- ②: Shortly press button "ENTER" to move cursor and shortly press button "ENTER" to select values. Long press button "ENTER" to confirm value settings.
- ③: Long press button "EMER" to confirm protective parameters settings.



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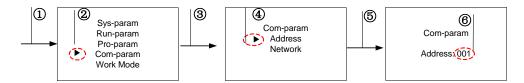
Cou	ıntry Code	Vgrid-max	Vgrid-min	Fgrid-max	Fgrid-min
GB	SG10KTL	260V	210V	50.4Hz	47.1Hz
	SG12/15KTL	264V	184V	52.0Hz	47.0Hz
DE		264V	184V	51.5V	47.5Hz
FR		264V	184V	50.2Hz	47.5Hz
IT		276V	184V	50.3Hz	49.7Hz
ES		253V	195.5V	51.0Hz	48.0Hz
АТ		253V	195V	51.0Hz	47.0Hz
AU		260V	210V	51.0Hz	49.0Hz
CZ		264V	195.5V	50.5Hz	49.5Hz
BE		264V	196V	51.5Hz	47.5Hz
Othe	er	230V~276V	184V~230V	50Hz~53Hz	47~50Hz
		Default: 264V	Default: 184V	Default:51.5Hz	Default:47.5Hz

The default country code is "DE". Inverters are in conformity with Low Voltage Directive (VDE-AR-N 4105). If you choose "DE" country code, you also need to choose Low Voltage Directive.



10.7.10 Set Communication Parameters

Parameters of RS485 communication



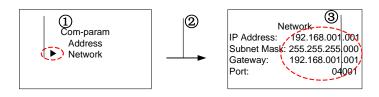
- ①: Enter into parameters setting screen, following operation①~⑤ in "Set language".
- ②: Shortly press button "ss " to move arrow to item "Com-param".
- ③: Long press button "enter" to enter into sub-screen.
- 4: Shortly press button "Esc" to move arrow to item "Serial ports".
- ⑤: Long press button "enter" to enter into sub-screen.
- ⑥: Shortly press button "ener" to move right and shortly press button "ese" to set values.



The range of communication address is 1~247. And the default baud rate is 9600.

Parameters of Ethernet communication

The IP address setting is valid only after restarting the inverter.



- 1: Shortly press button "see" to move arrow to item "Network".
- ②: Long press button "enter" to enter into sub-screen.
- ③: Shortly press button "ENTER" to move right and shortly press button "ESC" to set values.

10.8 Start and Stop Inverter

Start the Inverter



- ①: Long press button "ENTER" to enter into main control screen.
- ②: Shortly press button "Esc" to move arrow to item "Start/Stop" and long press button "Esc" to confirm.
- ③: Shortly press button "Exer" to move arrow to item "Start" and long press button "EXER" to start the inverter.

Stop the Inverter



- ①: Long press button "ENTER" to enter into main control screen.
- ②: Shortly press button "Esc" to move arrow to item "Start/Stop" and long press button "Esc" to confirm.
- ③: Shortly press button "so "to move arrow to item "Stop" and long press button "emer" to stop the inverter.

APPENDIX

Technical Data

Parameters	SG10KTL	SG12KTL	SG15KTL	
DC Side Data				
Max. Input Voltage	1000V			
Start Voltage	250V			
MPP Voltage Range	250~800V	330~800V	380~800V	
Max. Input Power	10.4kW	12.5kW	15.6kW	
Rated DC Power	10.3kW	12.2kW	15.3kW	
Rated DC Voltage	650V			
Max. Input Current	40A(20A*2)			
Isc PV	50A(25A*2)			
Number of MPP Trackers/Strings Per MPP Tracker	nber of MPP Trackers/Strings Per MPP Tracker 2/3			
AC Side Data				
Rated Output Power	10kW	12kW	15kW	
Max. Output Current	16A	19A	24A	
Rated Output Voltage	3/N/PE, 230V/400V			
Output Voltage Range	184~276V			
Rated Output Frequency	50Hz			
Output Frequency Range	47~53Hz			
Output Current THD	<3% (at nominal power)			
DC Current Injection	<0.5%(at rated output current)			

Power Factor	0.9(lagging)~0.9(leading)			
System				
Max. Efficiency	98.0%			
Euro. Efficiency	97.2% 97.2% 97.3%			
Enclosure	IP54[Fans], IP65[Other]			
Safety Class	I			
Overvoltage Category	III[MAINS],II[PV]			
Pollution Degree	3			
Wet Location	Yes			
Ambient Temperature	-25℃~60℃			
Relative Humidity	0~95%, non-condensing			
Cooling Method	Controlled forced-air cooling			
Max. Altitude	x. Altitude 2000m			
Display and Communication				
Display				
ndard Comm. Interface RS485				
Optional Comm. Interface Ethernet				
Mechanical Data				
Dimensions (W*H*D)	mensions (W*H*D) 648*686*243mm			
Net Weight	50kg			

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Company:	Sungrow Power Supply Co., Ltd.
Website:	www.sungrowpower.com
Contact:	Mr. Henry (Director of International Trade)
Email:	info@sungrow.cn, service@sungrow.cn
Address:	No.2 Tianhu Rd., New & High Technology Industrial Development Zone, Hefei, P.R.China
Zip:	230088
Telephone:	+86 551 532 7834, +86 551 532 7845
Fax:	+86 551 532 7856



Sungrow Power Supply Co., Ltd.

Add: No.2 Tianhu Rd., New & High Technology Industrial Development Zone, Hefei, P.R.China.
Contact: Mr. Henry (Director of International Trade)
Zip: 230088

Fax: +86 551 532 7856

E-mail: info@sungrow.cn

Web: www.sungrowpower.com

Tel: +86 551 532 7834/532 7845